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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:

Marc Bednarz, et al.

Application No.: 10/530,428

Group Art Unit: 5771

Filed: April 5, 2005

Examiner: Karie Amber ONeill

For: ELECTROLYTE MATRIX, PARTICULARLY FOR A MOLTEN CARBONATE
FUEL CELL, AND METHOD FOR THE PRODUCTION THEREOF

Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

DECLARATION UNDER 37 C.F.R. §1.132

I, Marc Bednarz, declare and say:

That I am an inventor in the above-identified patent application;

That I graduated in 1996 with a Dipl. Chem. degree in Chemistry from University of
Hamburg, Germany; I also graduated in 2002 with a doctors degree in Chemistry from
University of Hamburg.

I have been working in the field of fuel cells since about 1996, including doctoral
thesis.

That I am familiar with the above-identified patent application and with the reference
cited by the Examiner, i.e., Friedrich, WO 02/4142382;

The shelf life of lab electrolyte matrix green tape samples was limited to a time frame of 2-4 weeks, depending on temperature and humidity. This time frame is far too short for a commercial use of this material in MCFCs. The material has to be produced, dried, quality control measures have to be done, followed by the procedure of stacking the MCFC components, where the matrix tape is built in as a green tape. Subsequently there follows the instrumentation of the stack using thermocouples and the assembly into the thermal insulation (module). The duration until the conditioning procedure (binder burnout, etc.) of the stack starts takes at least 4-6 weeks. For this reason a shelf time of at least 3 months is required. The shelf time of green matrix tapes containing TiC exceeds 6 months. Due to the fact that Ti belongs to the same group of elements as Zr, this was not to be expected. The behavior of the ZrC containing samples showed a loss of mechanical flexibility, a change in sample density and discoloration, indicating undesired chemical reactions;

The handling properties of ZrC containing samples is characterized by low and changing stability of the green tape. During stacking of such a matrix tape in a product size of about 1 square meter, bending results and mechanical properties of samples containing TiC were significantly better in terms of bending radius, brittleness and elongation at fracture. This fact also was not to be expected by replacing ZrC by a material from the same group of element carbide;

The above comparisons demonstrate that the use of TiC provides superior and unexpected benefits when compared with the use of ZrC in an electrolytic matrix for a molten carbonate fuel cell.

That the undersigned declares further that all statements made herein of his own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements are made with knowledge that willful false statements in the likes so made are punishable by a fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patents issuing thereon.

Date 2008-05-20



Marc Bednarz